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LEYDEN
LEWIS
BOONVILLE
FORESTPORT
WILMURT
AVA
WESTERN
LEE
STEUBEN
REMSEN
TRENTON
RUSSIA
FLOYD
ROME
VIENNA
VERONA
MARCY
DEERFIELD
NEWPORT
WHITESTOWN
ONEIDA LAKE
MOHAWK RIVER
Boonville
Forestport
Rome
Wickwire Hill
Thomson Corners

GLACIAL WATERS
IN THE
BLACK AND MOHAWK VALLEYS

H. L. FAIRCHILD

1909

LEGEND

MORAINES

- Till and kame
- Kame

GLACIAL STREAM CHANNELS

- Channel with both banks preserved
- Channel with one bank only, the other bank having been the ice
- Channel hypothetical, or with indefinite borders

DELTAS OR SANDPLAINS

- Herkimer lake
- Forestport lake
- Schoharie lake
- Port Leyden lake
- Amsterdam lake
- Iroquois lake

WAVE-WORK OF LAKE IROQUOIS

- Bars and spits
- Cliffs

INTERPRETATION

COMPARE MAPS, PLATES 13-17

This district, at the head of both the Black and Mohawk valleys, contains records of all the glacial lake history of the Mohawk basin, from Herkimer lake down to Iroquois. The northern edge of the ice tongue (see plate 13) had a trend northwest to southeast. The heavy moraines and the channels mark the positions of the ice margin. With the slow backing away of the ice front, southwestward, stream and delta features were produced in connection with all the Mohawk waters.

The heavy broken line denotes the south boundary of the Black river basin. In that basin the Forestport sandplains correlate with the Remsen outlet: the Port Leyden plains with the Booneville or Lansing kill outlet.

The Kame-Moraine areas are only partially indicated.

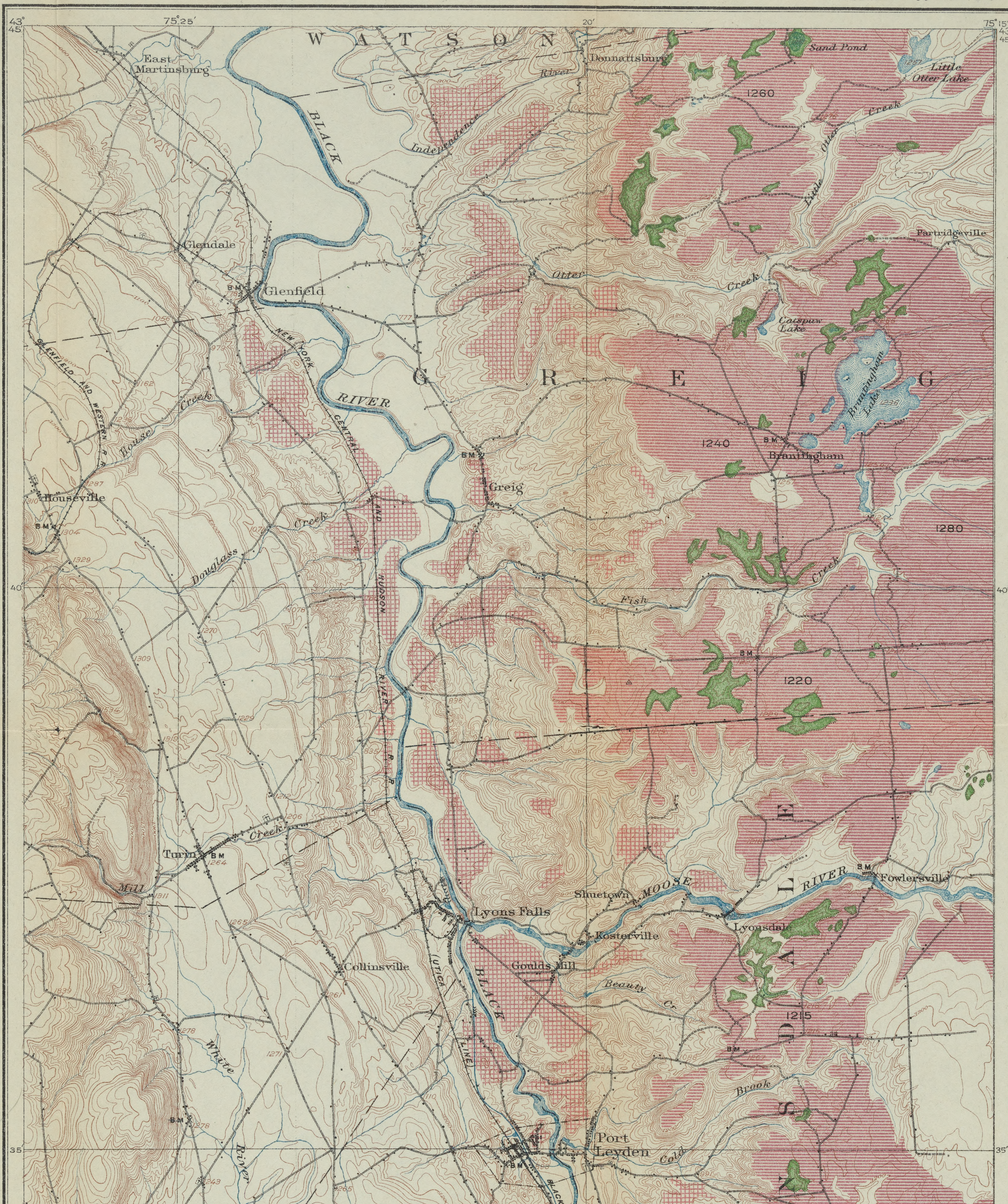
Scale $\frac{1}{62\,500}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

Contour interval 20 feet.

Datum is mean sea level.


WATSON
GREIG
LYONSDALE
BOONVILLE
East Martinsburg
Donnattsburg
Sand Pond
Little Otter Lake
Glendale
Glenfield
Partridgeville
Otter Creek
Little Otter Creek
Independence River
Black River
New York Central and Hudson River R. R.
Glenfield and Western R. R.
House Creek
Houseville
Brantingham
Brantingham Lake
Catspaw Lake
Greig
Douglass Creek
Fish Creek
Turin
Mill Creek
Lyons Falls
Shuetown
Moose River
Fowlersville
Kosterville
Lyonsdale
Goulds Mill
Beauty Cr.
Collinsville
(Utica Line)
White River
Brook
Port Leyden
Cold Brook
Miller Brook
Fall Brook
Constableville
Locust Grove
Black River Canal
Bucks Cors
Talcottville
Denley Sta.
Leyden Station P.O.
Boundary Line
Mile Creek
Lewis Co.
Oneida Co.
1260
1240
1280
1220
1215
1200
1160
1180
43° 45'
75° 25'
20'
75° 15'
40'
35'
43° 30'
B M

GLACIAL WATERS
IN THE
BLACK VALLEY

H. L. FAIRCHILD
1909

LEGEND

DELTAS OR SANDPLAINS

▤ *Port Leyden lake*
▦ *Glenfield lake*

KETTLES IN SANDPLAINS

🟩

INTERPRETATION

COMPARE MAPS, PLATES 15-17

The steep slopes of the east side of the valley are the delta sands, eroded by present agencies. Only the more prominent of the Glenfield lake terraces are indicated.

The apparent terraces on the west wall of the valley are rock (limestone) benches, with little drift and slight lake deposits.

Scale $\frac{1}{62500}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

Contour interval 20 feet.
Datum is mean sea level.

EDUCATION DEPARTMENT
JOHN M. CLARKE
STATE GEOLOGIST

UNIVERSITY OF THE STATE OF NEW YORK
STATE MUSEUM

GLACIAL WATERS IN THE BLACK AND ONTARIO VALLEYS

H. L. FAIRCHILD

1909

LEGEND

GLACIAL STREAM CHANNELS

- 🟩 *Channel with both banks preserved*
- 🟩 *Channel with south bank only, the north bank having been the ice*
- ▨ *Channel hypothetical, or with indefinite borders*

DELTAS

- ▦ *Glenfield lake*
- ▨ *Iroquois lake*
- ▨ *Rodman (local) lake*

WAVE-WORK OF LAKE IROQUOIS

- 🟥 *Bars and spits*
- 🟥 *Cliffs*

INTERPRETATION

COMPARE MAPS, PLATES 16-17

The channels in the town of Harrisburg carried the waters of the glacial lake in the Deer valley eastward into Glenfield lake. All the other channels carried the falling waters westward around into lake Iroquois. The Iroquois shoreline is undetermined in the valley of Black river.

Scale $\frac{1}{62500}$

Contour interval 20 feet.

Datum is mean sea level.

44° 00'
76°00'
55'
50'
75°45'
40'
75°35'
43° 45'
PAMELIA
LERAY
WILNA
CHAMPION
WATERTOWN
RUTLAND
DENMARK
RODMAN
PINCKNEY
HARRISBURG
ADAMS
LORRAINE
WORTH
MONTAGUE
MARTINS
Glen Park
WATERTOWN
Huntingtonville
East Watertown
Watertown Center
Burrs Mills
Rutland Center
Rutland Lake
Middle Road Church
CARTHAGE
West Carthage
Champion
Champion Huddle
Pleasant Lake
Deer River
Kings Falls
South Champion
Tylerville South Rutland P.O.
High Falls
Copenhagen
Denmark
Pinckney
Harrisburg
Whitesville East Rodman P.O.
Rodman
Stowell Corner
Rices
North Adams
Adams Center
Honeyville
Greens Settlement
Adams
Allendale
The Gulf
Tremaines Corners
Barnes Corners
Klondike Worth P.O.
Lorraine
New Boston
Bellwood
Windecker
Montague
Gardners Corners
Rector
Lanesburg
BLACK RIVER
Sandy Creek
Deer River
JEFFERSON CO
LEWIS CO
1 ½ 0 1 2 3 4 Miles
1 ½ 0 1 2 3 4 5 Kilometers

FRANKFORT
LITCHFIELD
GERMAN FLATS
LITTLE FALLS
COLUMBIA
WINFIELD
WARREN
RICHFIELD
PLAINFIELD
BRIDGEWATER
PARIS
THE GULF
Davville
Clayville
Cranes Corners
Jerusalem
Elizabeth
Spinnerville
Denison Corners
German Corners
Edicks
Paines Hollow
Deck
Smith Corners
Goodiers Corners
Cedar Lake
Richfield Junction
Babcock Hill
North Winfield
Cedarville
Columbia Center
Columbia P.O.
Millers Mills
Little Unadilla Lake
Millers Mills Sta.
Cedarville Sta.
Chepachet
Jordanville
Crains Corners
North Bridgewater
East Winfield
Winfield P.O.
West Winfield
Bridgewater
South Columbia
Cullen
Brighton Corners
Woods Corners
Richfield
Sunset Hill
Richfield Springs
Weaver Lake
Warren
Little Lakes
Young Lake
Mt. Tom
Summit Lake
Springfield
Springfield Center
Wajontha Mt.
Mohegan Hill
Allen Lake
Deowongo
Canadarago Lake
Otsego Mt.
Wellington Mt.
Pine Cobble
Unadilla Forks
River Forks Sta.
Fork Mtn
Plainfield Center
Leonardsville
Unadilla River
Ohisa Creek
Moyer Creek
Fulmer Creek
Steele Creek
Trout Brook
Herkimer Co.
Oneida Co.
Otsego Co.
Boundary Line
Delaware Lackawanna and Western R.R.
Richfield Springs Branch
75°15′
10′
5′
75°00′
55′
74°50′
43°00′
55′
42°50′

GLACIAL WATERS
IN THE
MOHAWK VALLEY
H. L. FAIRCHILD
1909

LEGEND

GLACIAL STREAM CHANNELS

🟩	*Channel with both banks preserved*
▨	*Channel hypothetical, or with indefinite borders*

DRUMLINS

🟥

INTERPRETATION
COMPARE MAPS, PLATES 11-13

These two channels were the outlets of the earliest glacial waters, the Adirondack waters and Herkimer lake.

The drumlins in this district, of which only a few are indicated, show westward flow of the later ice in the Mohawk valley.

The heavy broken line is the divide between Mohawk and Susquehanna drainage.

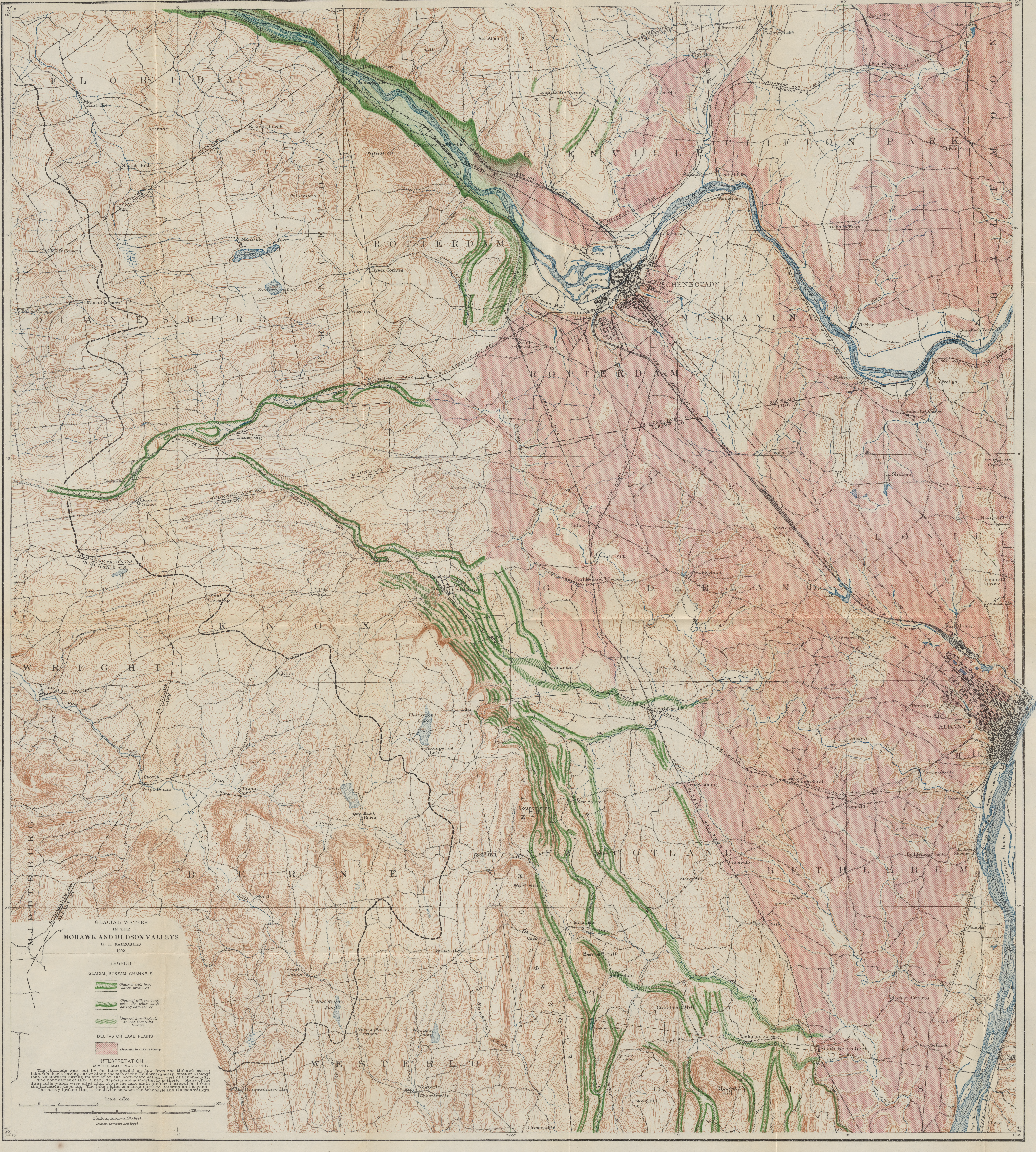
Scale $\frac{1}{62500}$

½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

Contour interval 20 feet.

Datum is mean sea level.


FLORIDA
GLENVILLE
CLIFTON PARK
ROTTERDAM
DUANESBURG
PRINCETOWN
NISKAYUNA
SCHENECTADY
COLONIE
GUILDERLAND
KNOX
WRIGHT
BERNE
NEW SCOTLAND
BETHLEHEM
WESTERLO
COEYMANS
MIDDLEBURG
SCHOHARIE
HELDERBERG MOUNTAINS
ALBANY
MOHAWK
SCHENECTADY CO.
ALBANY CO.
SCHOHARIE CO.
SARATOGA CO.
BOUNDARY LINE
Thompsons Lake
Warner Lake
Altamont
Voorheesville
New Salem
Slingerland
Delmar
Ballston Lake
Burnt Hills
Scotia
Vischer Ferry
Rensselaerville
74°15'
74°00'
73°45'
42°55'
42°30'

GLACIAL WATERS
IN THE
MOHAWK AND HUDSON VALLEYS
H. L. FAIRCHILD
1909

LEGEND

GLACIAL STREAM CHANNELS

🟩	*Channel with both banks preserved*
🟩	*Channel with one bank only, the other bank having been the ice*
▨	*Channel hypothetical, or with indefinite borders*

DELTAS OR LAKE PLAINS

🟥	*Deposits in lake Albany*

INTERPRETATION
COMPARE MAPS, PLATES 14-17

The channels were cut by the later glacial outflow from the Mohawk basin; lake Schoharie having outlet along the face of the Helderberg scarp, west of Albany; lake Amsterdam having its outlet on the Rotterdam salient, west of Schenectady.
The boundaries of lake Albany deposits are somewhat hypothetic. Many of the dune hills which were piled high above the lake plain are not distinguished from the lacustrine deposits. The lake plains continue north to Ballston and beyond.
The heavy broken line is the divide between the Schoharie and Hudson valleys.

Scale $\frac{1}{62500}$

1 ½ 0 1 2 3 4 Miles

1 ½ 0 1 2 3 4 5 Kilometers

Contour interval 20 feet.

Datum is mean sea level.

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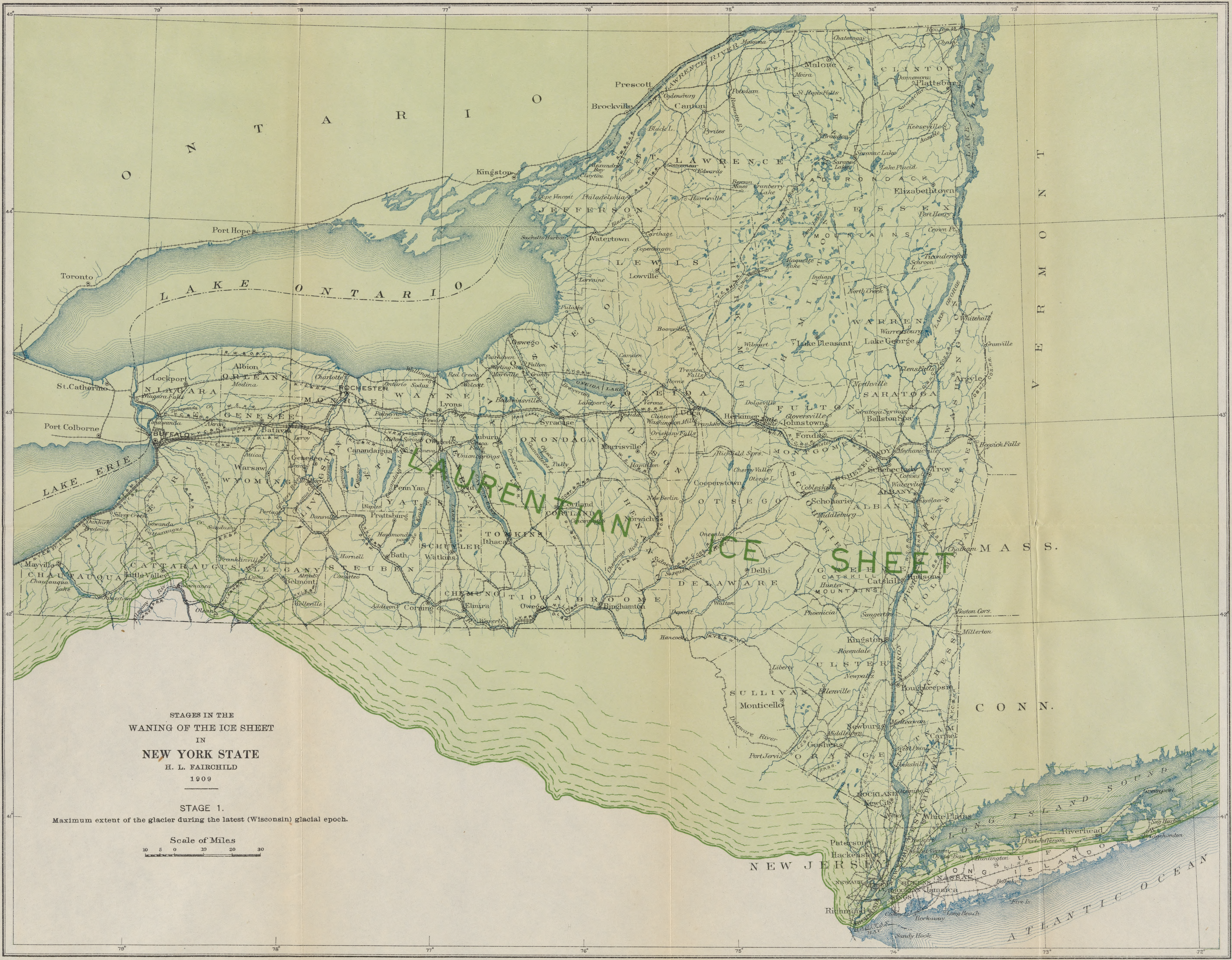
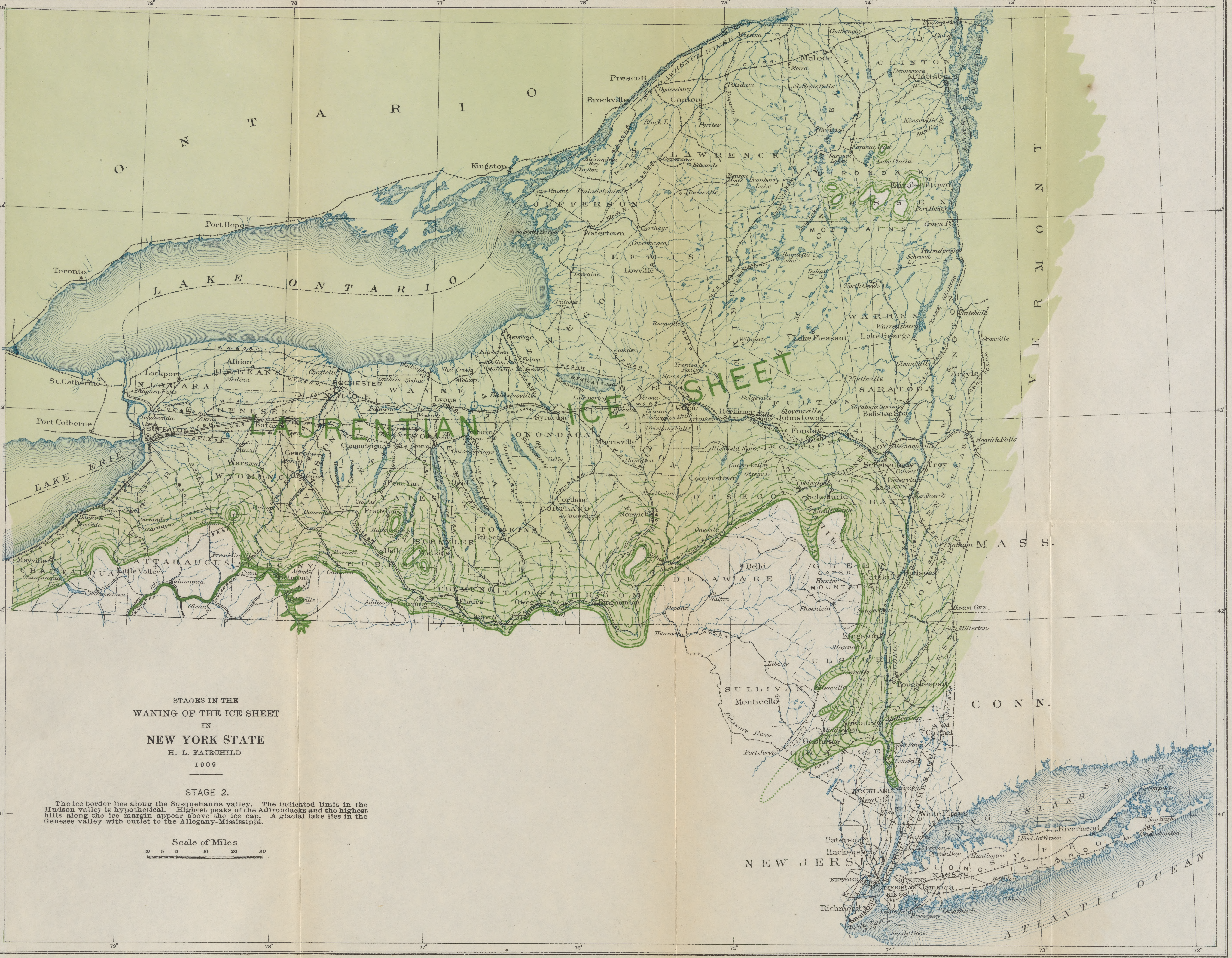
BULLETIN 160 PLATE 9


LAURENTIAN ICE SHEET
ONTARIO
LAKE ONTARIO
LAKE ERIE
VERMONT
MASS.
CONN.
NEW JERSEY
ATLANTIC OCEAN
LONG ISLAND SOUND
ST. LAWRENCE RIVER
ADIRONDACK MOUNTAINS
CATSKILL MOUNTAINS
LAKE CHAMPLAIN
LAKE GEORGE
ONEIDA LAKE
HUDSON RIVER
Delaware River
Toronto
Port Hope
Kingston
Brockville
Prescott
St. Catherines
Port Colborne
Buffalo
Rochester
Syracuse
Oswego
Watertown
Utica
Albany
Troy
Schenectady
Binghamton
Elmira
Ithaca
Kingston
Poughkeepsie
Newburg
Plattsburg
Malone
Ogdensburg
Canton
Potsdam
Lowville
Herkimer
Johnstown
Saratoga Springs
Glens Falls
Cooperstown
Norwich
Delhi
Catskill
Hudson
Monticello
Goshen
Port Jervis
Paterson
Hackensack
White Plains
Riverhead
Jamaica
Mayville
Jamestown
Salamanca
Olean
Belmont
Bath
Corning
Owego
Cortland
Auburn
Geneva
Canandaigua
Penn Yan
Watkins
Lyons
Batavia
Lockport
Albion
Warsaw
Geneseo
Elizabethtown
Lake Pleasant
Lake George
Ballston Spa
Fonda
Schoharie
Cattaraugus
Chautauqua
Allegany
Steuben
Chemung
Tioga
Broome
Delaware
Sullivan
Ulster
Orange
Rockland
Westchester
Putnam
Dutchess
Columbia
Greene
Schoharie
Otsego
Chenango
Madison
Oneida
Herkimer
Hamilton
Fulton
Montgomery
Saratoga
Warren
Washington
Rensselaer
Essex
Clinton
Franklin
St. Lawrence
Jefferson
Lewis
Oswego
Onondaga
Cayuga
Seneca
Tompkins
Cortland
Schuyler
Yates
Ontario
Wayne
Monroe
Orleans
Niagara
Genesee
Wyoming
Livingston
Erie
Suffolk
Nassau
Queens
Kings
Richmond
79°
78°
77°
76°
75°
74°
73°
72°
45°
44°
43°
42°
41°

STAGES IN THE
WANING OF THE ICE SHEET
IN
NEW YORK STATE
H. L. FAIRCHILD
1909

STAGE 1.
Maximum extent of the glacier during the latest (Wisconsin) glacial epoch.

Scale of Miles
10 5 0 10 20 30

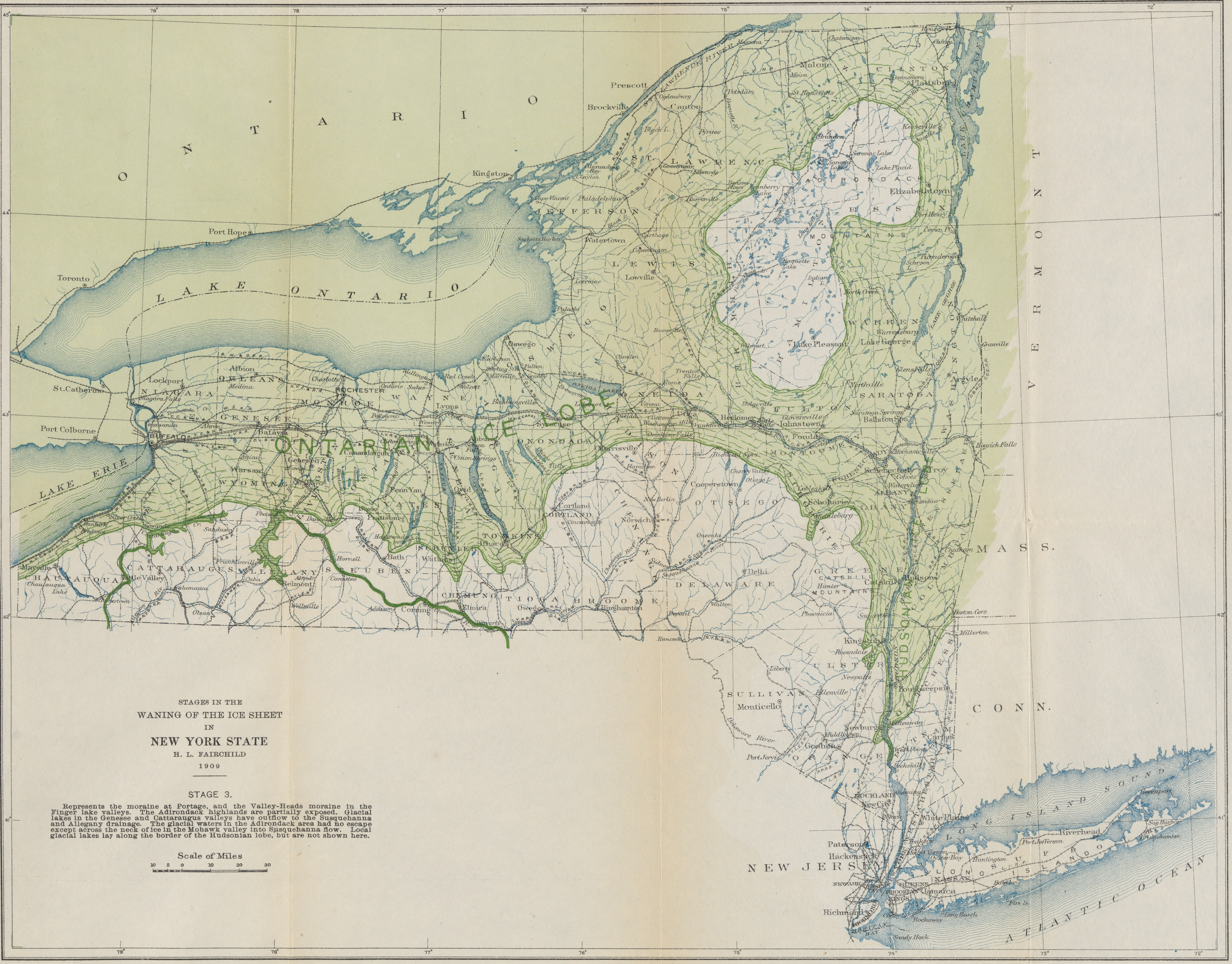

ONTARIO
LAKE ONTARIO
LAKE ERIE
LAURENTIAN ICE SHEET
VERMONT
MASS.
CONN.
NEW JERSEY
LONG ISLAND SOUND
ATLANTIC OCEAN
LAKE CHAMPLAIN
LAKE GEORGE
ADIRONDACK MOUNTAINS
CATSKILL MOUNTAINS
ST. LAWRENCE RIVER
Toronto
Port Hope
Kingston
Prescott
Brockville
St. Catherine
Port Colborne
BUFFALO
ROCHESTER
Syracuse
Utica
Oswego
Watertown
Albany
Troy
Schenectady
Binghamton
Elmira
Ithaca
Kingston
Poughkeepsie
Newburg
Monticello
Delhi
Cooperstown
Plattsburg
Malone
Elizabethtown
Lake Placid
Lowville
Herkimer
Johnstown
Fonda
Saratoga Springs
Ballston Spa
Glens Falls
Norwich
Cortland
Owego
Olean
Salamanca
Mayville
Geneseo
Batavia
Lockport
Albion
Canandaigua
Penn Yan
Bath
Hornell
White Plains
Riverhead
Sag Harbor
Jamaica
Paterson
Hackensack
Newark
Richmond
Sandy Hook
CLINTON
ESSEX
FRANKLIN
ST. LAWRENCE
JEFFERSON
LEWIS
HAMILTON
HERKIMER
WARREN
WASHINGTON
SARATOGA
FULTON
MONTGOMERY
SCHENECTADY
ALBANY
RENSSELAER
COLUMBIA
GREENE
ULSTER
DUTCHESS
SULLIVAN
ORANGE
PUTNAM
ROCKLAND
WESTCHESTER
DELAWARE
SCHOHARIE
OTSEGO
CHENANGO
BROOME
TIOGA
CHEMUNG
STEUBEN
SCHUYLER
TOMPKINS
CORTLAND
ONONDAGA
MADISON
ONEIDA
OSWEGO
CAYUGA
SENECA
YATES
ONTARIO
WAYNE
MONROE
LIVINGSTON
GENESEE
ORLEANS
NIAGARA
ERIE
WYOMING
ALLEGANY
CATTARAUGUS
CHAUTAUQUA
NASSAU
SUFFOLK
QUEENS
KINGS
79°
78°
77°
76°
75°
74°
73°
72°
45°
44°
43°
42°
41°

STAGES IN THE
WANING OF THE ICE SHEET
IN
NEW YORK STATE
H. L. FAIRCHILD
1909

STAGE 2.

The ice border lies along the Susquehanna valley. The indicated limit in the Hudson valley is hypothetical. Highest peaks of the Adirondacks and the highest hills along the ice margin appear above the ice cap. A glacial lake lies in the Genesee valley with outlet to the Allegany-Mississippi.

Scale of Miles
10 5 0 10 20 30


79°
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74°
73°
72°
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44°
43°
42°
41°
O N T A R I O
LAKE ONTARIO
LAKE ERIE
ONTARIAN ICE LOBE
HUDSONIAN LOBE
ST. LAWRENCE RIVER
V E R M O N T
MASS.
CONN.
NEW JERSEY
LONG ISLAND SOUND
ATLANTIC OCEAN
LAKE CHAMPLAIN
LAKE GEORGE
ADIRONDACK MOUNTAINS
CATSKILL MOUNTAINS
CLINTON
ST. LAWRENCE
JEFFERSON
LEWIS
ESSEX
HAMILTON
WARREN
WASHINGTON
SARATOGA
FULTON
MONTGOMERY
SCHENECTADY
ALBANY
RENSSELAER
COLUMBIA
GREENE
SCHOHARIE
OTSEGO
DELAWARE
ULSTER
DUTCHESS
SULLIVAN
ORANGE
PUTNAM
ROCKLAND
WESTCHESTER
SUFFOLK
NASSAU
QUEENS
KINGS
RICHMOND
OSWEGO
ONEIDA
HERKIMER
ONONDAGA
MADISON
CHENANGO
CORTLAND
TOMPKINS
BROOME
TIOGA
CHEMUNG
SCHUYLER
STEUBEN
YATES
SENECA
CAYUGA
WAYNE
ONTARIO
MONROE
ORLEANS
NIAGARA
GENESEE
WYOMING
LIVINGSTON
ALLEGANY
CATTARAUGUS
CHAUTAUQUA
ERIE
Toronto
Port Hope
Kingston
Prescott
Brockville
St. Catharines
Port Colborne
Buffalo
Lockport
Albion
Rochester
Batavia
Geneseo
Syracuse
Oswego
Watertown
Lowville
Utica
Rome
Herkimer
Schenectady
Troy
Albany
Cooperstown
Binghamton
Elmira
Corning
Ithaca
Cortland
Norwich
Hornell
Bath
Penn Yan
Belmont
Salamanca
Jamestown
Mayville
Malone
Plattsburg
Potsdam
Canton
Elizabethtown
Saranac Lake
Lake Placid
Lake Pleasant
Lake George
Glens Falls
Saratoga Springs
Ballston Spa
Johnstown
Gloversville
Fonda
Catskill
Hudson
Kingston
Poughkeepsie
Newburg
Monticello
Goshen
Port Jervis
New City
White Plains
Paterson
Hackensack
Newark
Jamaica
Riverhead
Port Jefferson
Sandy Hook

STAGES IN THE WANING OF THE ICE SHEET IN NEW YORK STATE

H. L. FAIRCHILD

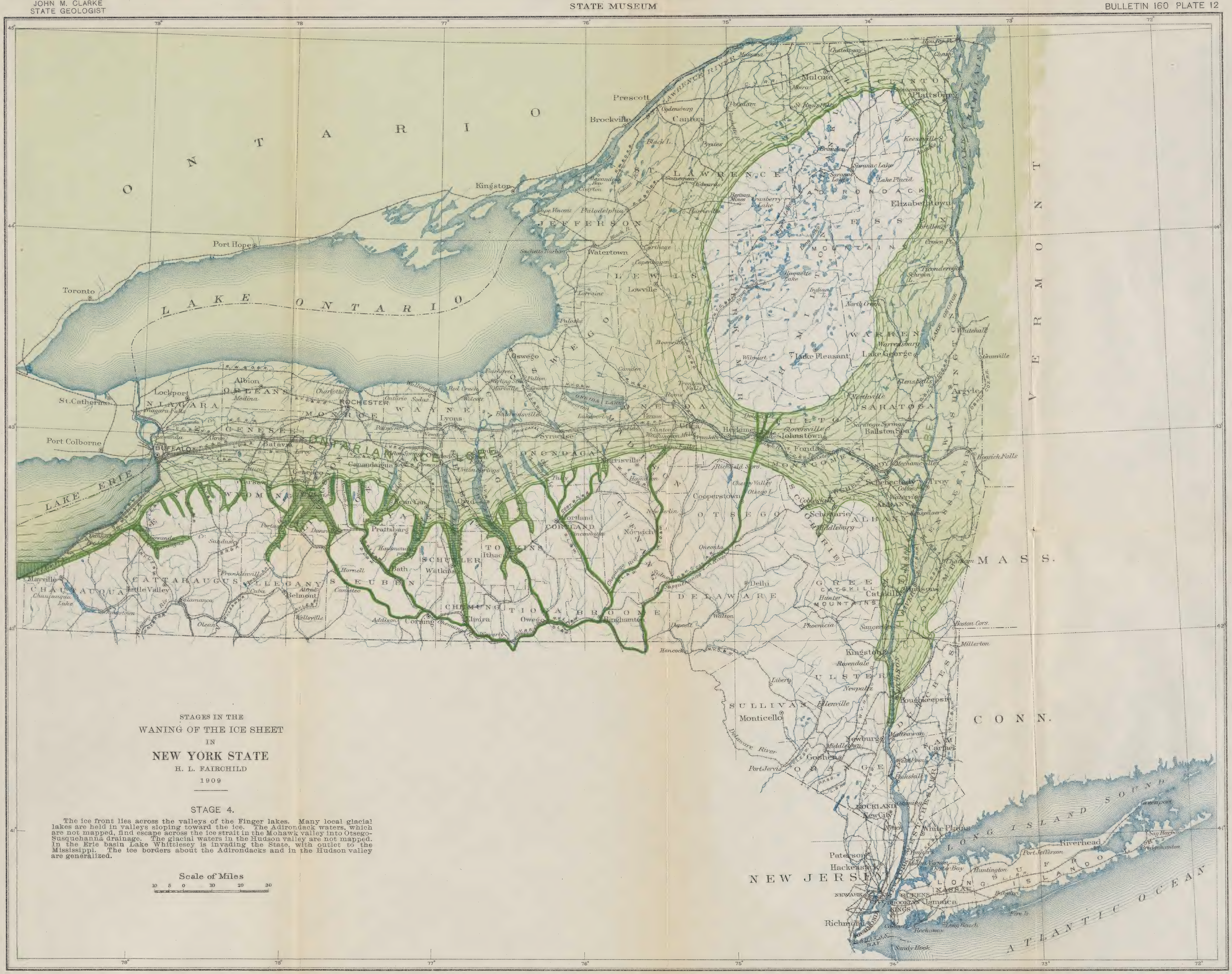
1909

STAGE 3.

Represents the moraine at Portage, and the Valley-Heads moraine in the Finger lake valleys. The Adirondack highlands are partially exposed. Glacial lakes in the Genesee and Cattaraugus valleys have outflow to the Susquehanna and Allegany drainage. The glacial waters in the Adirondack area had no escape except across the neck of ice in the Mohawk valley into Susquehanna flow. Local glacial lakes lay along the border of the Hudsonian lobe, but are not shown here.

Scale of Miles

10 5 0 10 20 30


LAKE ONTARIO
ONTARIO
LAKE ERIE
VERMONT
MASS.
CONN.
NEW JERSEY
LONG ISLAND SOUND
ATLANTIC OCEAN
LONG ISLAND
ADIRONDACK MOUNTAINS
CATSKILL MOUNTAINS
ST. LAWRENCE RIVER
LAKE CHAMPLAIN
LAKE GEORGE
ONEIDA LAKE
Toronto
Port Hope
Kingston
Prescott
Brockville
St. Catherines
Port Colborne
Buffalo
Lockport
Albion
Rochester
Lyons
Syracuse
Oswego
Watertown
Lowville
Rome
Utica
Herkimer
Johnstown
Gloversville
Schenectady
Troy
Albany
Saratoga Springs
Ballston Spa
Glens Falls
Lake George
Warrensburg
Lake Pleasant
Elizabethtown
Plattsburg
Malone
Canton
Potsdam
Ogdensburg
Cooperstown
Oneonta
Norwich
Cortland
Ithaca
Watkins
Bath
Elmira
Owego
Binghamton
Corning
Hornell
Belmont
Olean
Salamanca
Mayville
Little Valley
Kingston
Catskill
Hudson
Poughkeepsie
Newburgh
Goshen
Port Jervis
Monticello
White Plains
Paterson
Hackensack
Newark
Richmond
Riverhead
Sag Harbor
Port Jefferson
Huntington
Jamaica
Sandy Hook
NIAGARA
ORLEANS
MONROE
WAYNE
GENESEE
WYOMING
ONTARIO
ONONDAGA
OSWEGO
JEFFERSON
LEWIS
ST. LAWRENCE
FRANKLIN
CLINTON
ESSEX
HAMILTON
WARREN
WASHINGTON
SARATOGA
FULTON
MONTGOMERY
ONEIDA
HERKIMER
OTSEGO
CHENANGO
SCHOHARIE
SCHENECTADY
ALBANY
RENSSELAER
GREENE
COLUMBIA
DELAWARE
ULSTER
DUTCHESS
SULLIVAN
ORANGE
PUTNAM
ROCKLAND
WESTCHESTER
NASSAU
SUFFOLK
KINGS
QUEENS
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
STEUBEN
SCHUYLER
CHEMUNG
TIOGA
BROOME
TOMPKINS
CORTLAND
YATES
79°
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73°
72°
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44°
43°
42°
41°

STAGES IN THE
WANING OF THE ICE SHEET
IN

NEW YORK STATE

H. L. FAIRCHILD
1909

STAGE 4.

The ice front lies across the valleys of the Finger lakes. Many local glacial lakes are held in valleys sloping toward the ice. The Adirondack waters, which are not mapped, find escape across the ice strait in the Mohawk valley into Otsego-Susquehanna drainage. The glacial waters in the Hudson valley are not mapped. In the Erie basin Lake Whittlesey is invading the State, with outlet to the Mississippi. The ice borders about the Adirondacks and in the Hudson valley are generalized.

Scale of Miles

10 5 0 10 20 30

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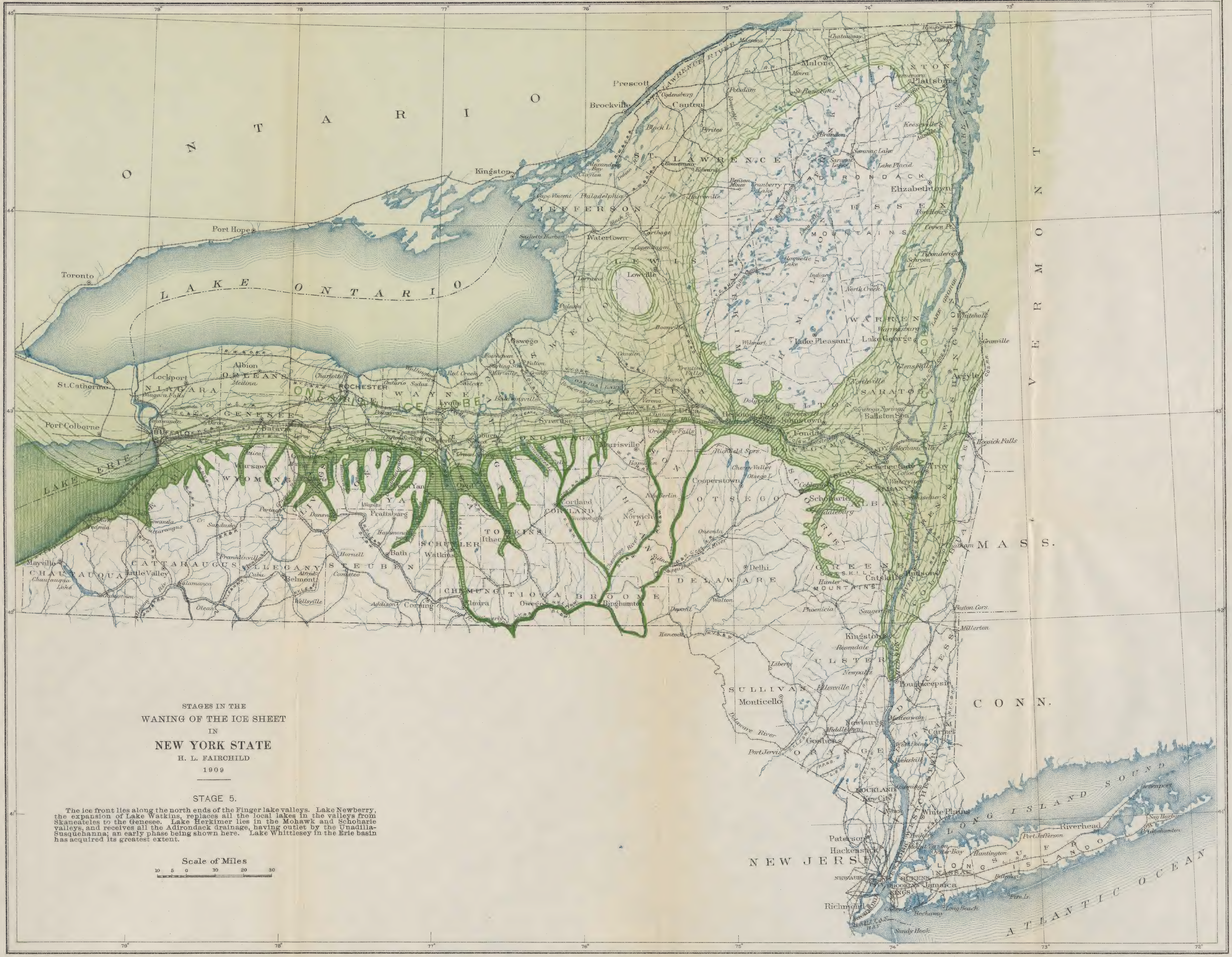
BULLETIN 160 PLATE 13


LAKE ONTARIO
ONTARIO
LAKE ERIE
ONTARIO ICE BED
VERMONT
MASS.
CONN.
NEW JERSEY
LONG ISLAND SOUND
ATLANTIC OCEAN
LAKE CHAMPLAIN
LAKE GEORGE
ADIRONDACK MOUNTAINS
CATSKILL MOUNTAINS
ST. LAWRENCE RIVER
Toronto
Port Hope
Kingston
Prescott
Brockville
St. Catherine
Port Colborne
Buffalo
Lockport
Rochester
Syracuse
Oswego
Watertown
Lowville
Rome
Utica
Herkimer
Johnstown
Fonda
Schenectady
Troy
Albany
Saratoga
Glens Falls
Plattsburg
Malone
Ogdensburg
Canton
Elizabethtown
Ticonderoga
Whitehall
Lake George
Cortland
Ithaca
Norwich
Cooperstown
Oneonta
Binghamton
Owego
Elmira
Corning
Bath
Hornell
Olean
Salamanca
Jamestown
Mayville
Dunkirk
Catskill
Kingston
Poughkeepsie
Newburgh
Monticello
Port Jervis
Goshen
White Plains
Paterson
Hackensack
Newark
Richmond
Jamaica
Riverhead
Sandy Hook
NIAGARA
ORLEANS
GENESEE
WAYNE
ONONDAGA
ONEIDA
OSWEGO
LEWIS
JEFFERSON
ST. LAWRENCE
FRANKLIN
CLINTON
ESSEX
HAMILTON
WARREN
SARATOGA
FULTON
MONTGOMERY
SCHOHARIE
OTSEGO
CHENANGO
MADISON
CORTLAND
TOMPKINS
SCHUYLER
STEUBEN
ALLEGANY
CATTARAUGUS
CHAUTAUQUA
WYOMING
CHEMUNG
TIOGA
BROOME
DELAWARE
GREENE
ULSTER
SULLIVAN
ORANGE
PUTNAM
DUTCHESS
ROCKLAND
WESTCHESTER
COLUMBIA
RENSSELAER
WASHINGTON
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QUEENS
KINGS
NASSAU
SUFFOLK
45°
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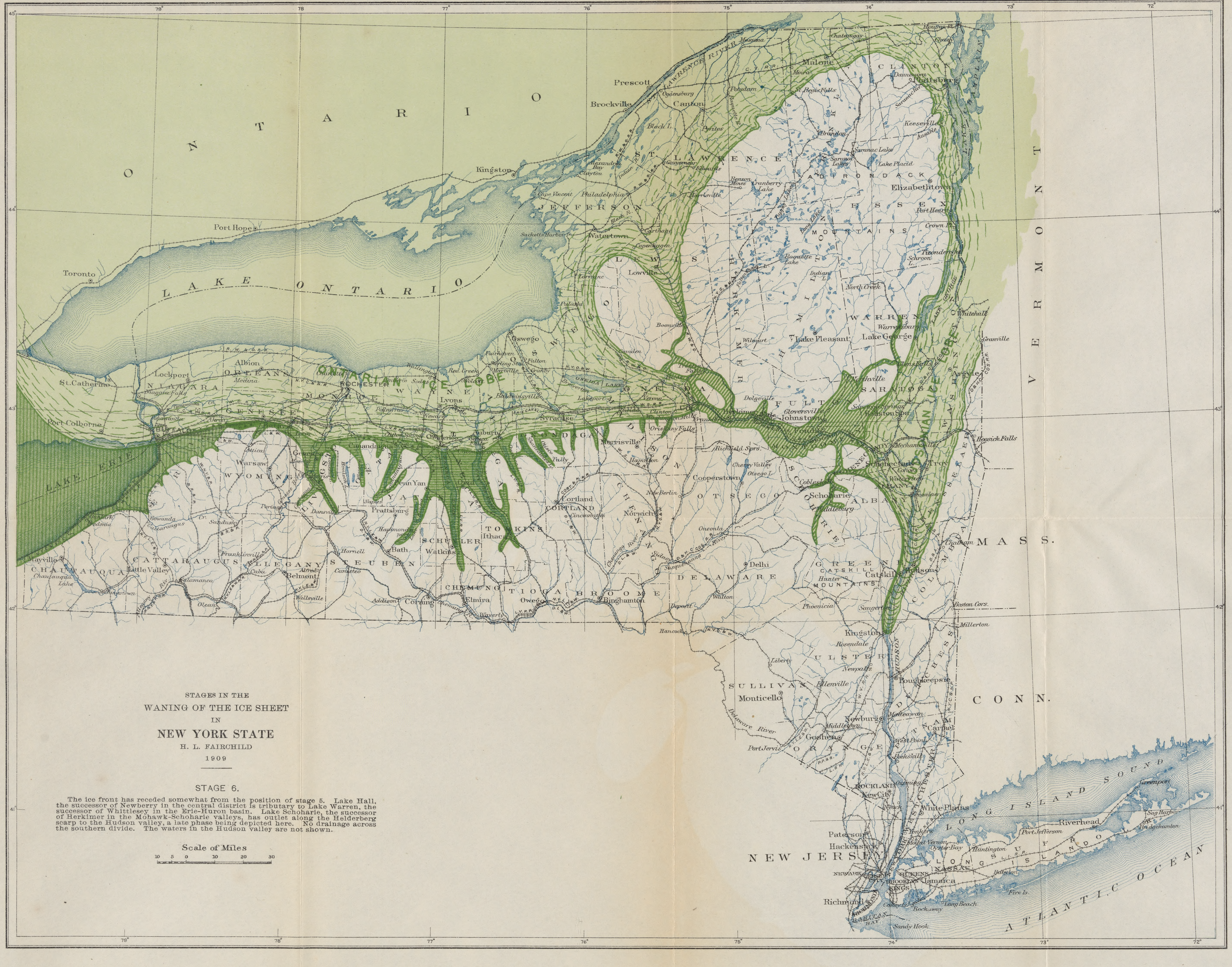
STAGES IN THE
WANING OF THE ICE SHEET
IN
NEW YORK STATE
H. L. FAIRCHILD
1909

STAGE 5.

The ice front lies along the north ends of the Finger lake valleys. Lake Newberry, the expansion of Lake Watkins, replaces all the local lakes in the valleys from Skaneateles to the Genesee. Lake Herkimer lies in the Mohawk and Schoharie valleys, and receives all the Adirondack drainage, having outlet by the Unadilla-Susquehanna; an early phase being shown here. Lake Whittlesey in the Erie basin has acquired its greatest extent.

Scale of Miles
10 5 0 10 20 30


O N T A R I O
LAKE ONTARIO
LAKE ERIE
ONTARIO ICE LOBE
CHAMPLAIN ICE LOBE
ADIRONDACK MOUNTAINS
CATSKILL MOUNTAINS
LONG ISLAND SOUND
LONG ISLAND
ATLANTIC OCEAN
VERMONT
MASS.
CONN.
NEW JERSEY
LAKE CHAMPLAIN
ST. LAWRENCE RIVER
HUDSON
Toronto
Port Hope
Kingston
Prescott
Brockville
St. Catherines
Port Colborne
Buffalo
Lockport
Rochester
Lyons
Syracuse
Oswego
Watertown
Lowville
Boonville
Auburn
Ithaca
Elmira
Corning
Binghamton
Cortland
Norwich
Oneonta
Cooperstown
Johnstown
Gloversville
Schenectady
Troy
Albany
Saratoga
Glens Falls
Lake George
Whitehall
Plattsburg
Malone
Potsdam
Canton
Ogdensburg
Elizabethtown
Kingston
Poughkeepsie
Newburg
Goshen
Port Jervis
Monticello
White Plains
Riverhead
Jamaica
Richmond
Paterson
Hackensack
Newark
Sandy Hook
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
STEUBEN
CHEMUNG
TIOGA
BROOME
DELAWARE
SULLIVAN
ULSTER
ORANGE
GREENE
COLUMBIA
DUTCHESS
PUTNAM
WESTCHESTER
ROCKLAND
NIAGARA
ORLEANS
MONROE
GENESEE
WAYNE
WYOMING
LIVINGSTON
YATES
SCHUYLER
TOMPKINS
CORTLAND
ONONDAGA
MADISON
ONEIDA
OSWEGO
LEWIS
JEFFERSON
ST. LAWRENCE
FRANKLIN
CLINTON
ESSEX
HAMILTON
HERKIMER
FULTON
SARATOGA
WARREN
WASHINGTON
RENSSELAER
ALBANY
SCHOHARIE
OTSEGO
CHENANGO
79°
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72°
45°
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43°
42°
41°

STAGES IN THE
WANING OF THE ICE SHEET
IN

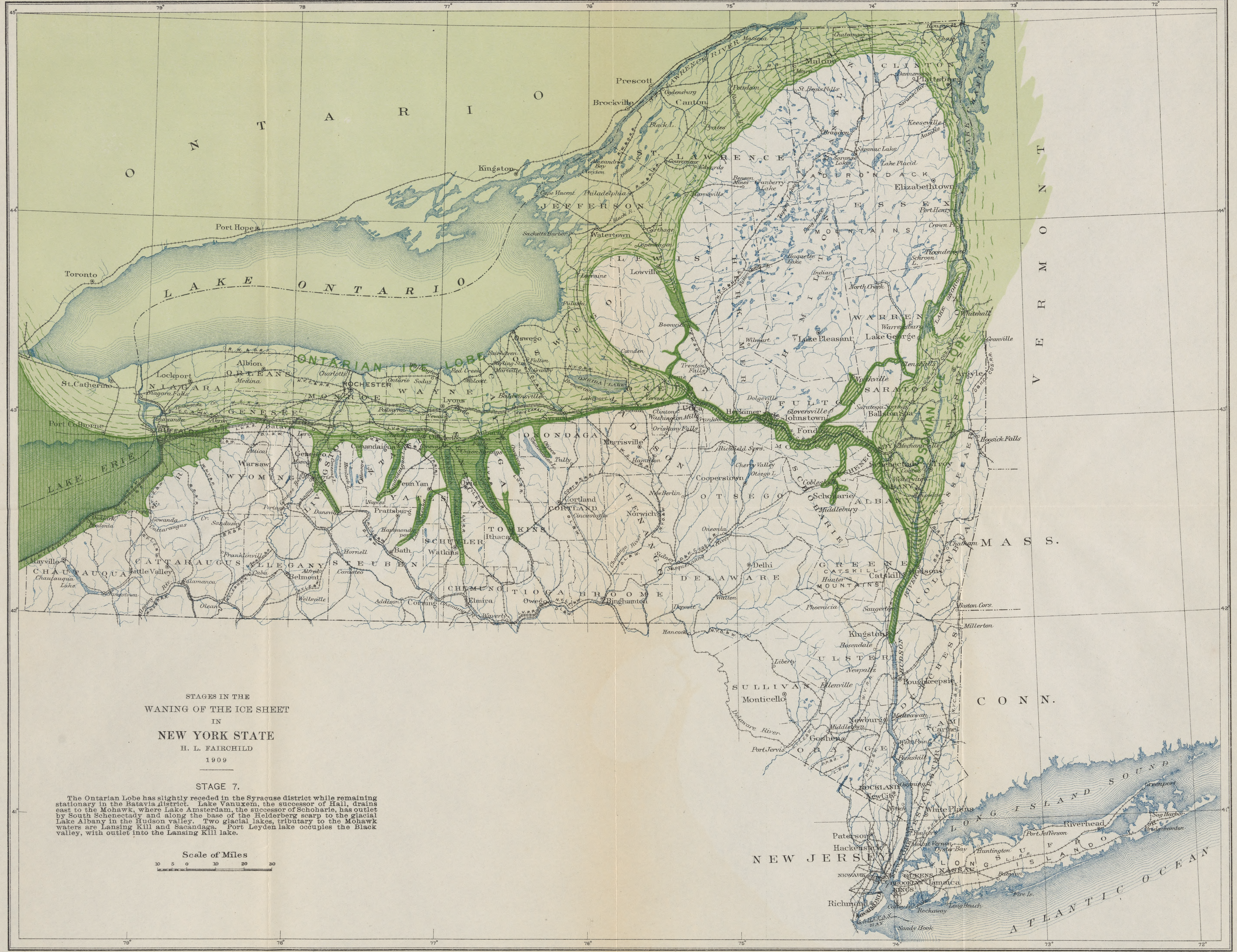
NEW YORK STATE

H. L. FAIRCHILD
1909

STAGE 6.

The ice front has receded somewhat from the position of stage 5. Lake Hall, the successor of Newberry in the central district is tributary to Lake Warren, the successor of Whittlesey in the Erie-Huron basin. Lake Schoharie, the successor of Herkimer in the Mohawk-Schoharie valleys, has outlet along the Helderberg scarp to the Hudson valley, a late phase being depicted here. No drainage across the southern divide. The waters in the Hudson valley are not shown.

Scale of Miles
10 5 0 10 20 30


LAKE ONTARIO
ONTARIO
ONTARIAN ICE LOBE
HUDSON ICE LOBE
LAKE ERIE
VERMONT
MASS.
CONN.
NEW JERSEY
ATLANTIC OCEAN
LONG ISLAND SOUND
LONG ISLAND
ADIRONDACK MOUNTAINS
CATSKILL MOUNTAINS
ST. LAWRENCE RIVER
HUDSON RIVER
LAKE CHAMPLAIN
LAKE GEORGE
ONEIDA LAKE
Toronto
Port Hope
Kingston
Prescott
Brockville
Buffalo
Rochester
Syracuse
Utica
Albany
Schenectady
Troy
Watertown
Lowville
Binghamton
Elmira
Ithaca
Kingston
Poughkeepsie
Newburg
Plattsburg
Malone
NIAGARA
ORLEANS
MONROE
WAYNE
GENESEE
WYOMING
LIVINGSTON
ONTARIO
YATES
SENECA
CAYUGA
ONONDAGA
OSWEGO
JEFFERSON
LEWIS
ST. LAWRENCE
FRANKLIN
CLINTON
ESSEX
HAMILTON
HERKIMER
ONEIDA
MADISON
FULTON
SARATOGA
WARREN
WASHINGTON
SCHENECTADY
ALBANY
SCHOHARIE
OTSEGO
CHENANGO
CORTLAND
TOMPKINS
SCHUYLER
STEUBEN
CHEMUNG
TIOGA
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DELAWARE
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COLUMBIA
RENSSELAER
ULSTER
SULLIVAN
ORANGE
DUTCHESS
PUTNAM
ROCKLAND
WESTCHESTER
NASSAU
SUFFOLK
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
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42°
41°

STAGES IN THE
WANING OF THE ICE SHEET
IN

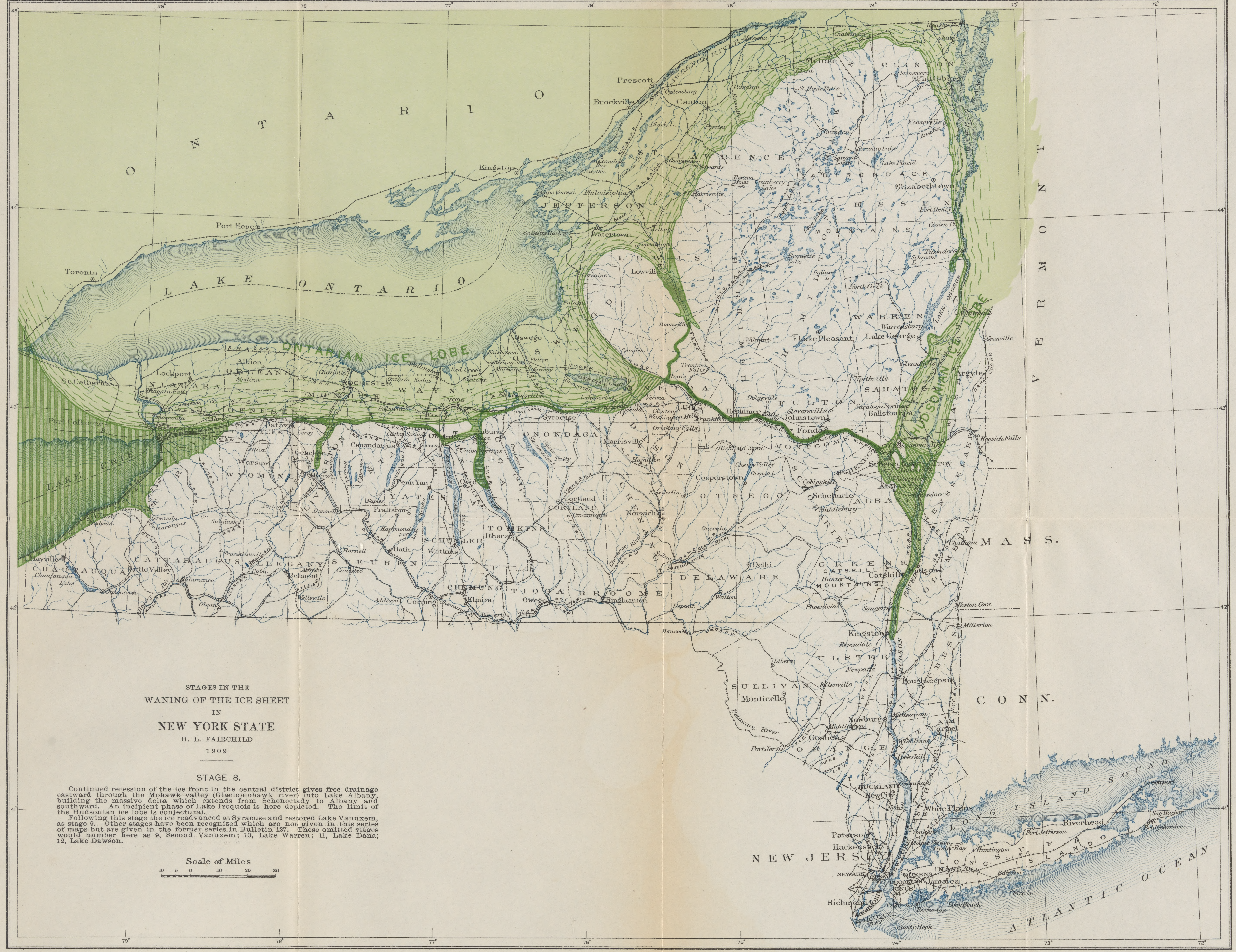
NEW YORK STATE

H. L. FAIRCHILD
1909

STAGE 7.

The Ontarian Lobe has slightly receded in the Syracuse district while remaining stationary in the Batavia district. Lake Vanuxem, the successor of Hall, drains east to the Mohawk, where Lake Amsterdam, the successor of Schoharie, has outlet by South Schenectady and along the base of the Helderberg scarp to the glacial Lake Albany in the Hudson valley. Two glacial lakes, tributary to the Mohawk waters are Lansing Kill and Sacandaga. Port Leyden lake occupies the Black valley, with outlet into the Lansing Kill lake.

Scale of Miles
10 5 0 10 20 30


O N T A R I O
LAKE ONTARIO
LAKE ERIE
ONTARIAN ICE LOBE
HUDSONIAN ICE LOBE
V E R M O N T
M A S S.
C O N N.
N E W J E R S E Y
L O N G I S L A N D S O U N D
A T L A N T I C O C E A N
ADIRONDACK MOUNTAINS
Toronto
Port Hope
Kingston
Prescott
Brockville
St Catherine
Port Colborne
Lockport
Rochester
Syracuse
Oswego
Watertown
Utica
Rome
Schenectady
Albany
Troy
Ogdensburg
Plattsburg
Saratoga Springs
Kingston
Poughkeepsie
Newburg
White Plains
Paterson
Hackensack
Newark
Brooklyn
Queens
Jamaica
Richmond
Sandy Hook
Riverhead
Greenport
Sag Harbor
Binghamton
Elmira
Ithaca
Cortland
Norwich
Delhi
Cooperstown
Catskill
Monticello
Port Jervis
Goshen
Jamestown
Olean
Salamanca
Mayville
Dunkirk
Batavia
Geneseo
Canandaigua
Penn Yan
Auburn
Geneva
Lyons
Bath
Hornell
Corning
Owego
Herkimer
Johnstown
Gloversville
Fonda
Lowville
Malone
Canton
Potsdam
Elizabethtown
Lake Pleasant
Lake George
Ballston Spa
Hudson
NIAGARA
ORLEANS
MONROE
WAYNE
GENESEE
WYOMING
LIVINGSTON
ONTARIO
YATES
SENECA
CAYUGA
ONONDAGA
OSWEGO
JEFFERSON
ST LAWRENCE
LEWIS
ONEIDA
MADISON
CHENANGO
OTSEGO
HERKIMER
HAMILTON
FRANKLIN
CLINTON
ESSEX
WARREN
WASHINGTON
SARATOGA
FULTON
MONTGOMERY
SCHENECTADY
SCHOHARIE
ALBANY
RENSSELAER
GREENE
COLUMBIA
DELAWARE
ULSTER
SULLIVAN
ORANGE
DUTCHESS
PUTNAM
ROCKLAND
WESTCHESTER
NASSAU
SUFFOLK
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
STEUBEN
SCHUYLER
CHEMUNG
TOMPKINS
CORTLAND
TIOGA
BROOME
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STAGES IN THE
WANING OF THE ICE SHEET
IN
NEW YORK STATE

H. L. FAIRCHILD

1909

STAGE 8.

Continued recession of the ice front in the central district gives free drainage eastward through the Mohawk valley (Glaciomohawk river) into Lake Albany, building the massive delta which extends from Schenectady to Albany and southward. An incipient phase of Lake Iroquois is here depicted. The limit of the Hudsonian ice lobe is conjectural.

Following this stage the ice readvanced at Syracuse and restored Lake Vanuxem, as stage 9. Other stages have been recognized which are not given in this series of maps but are given in the former series in Bulletin 127. These omitted stages would number here as 9, Second Vanuxem; 10, Lake Warren; 11, Lake Dana; 12, Lake Dawson.

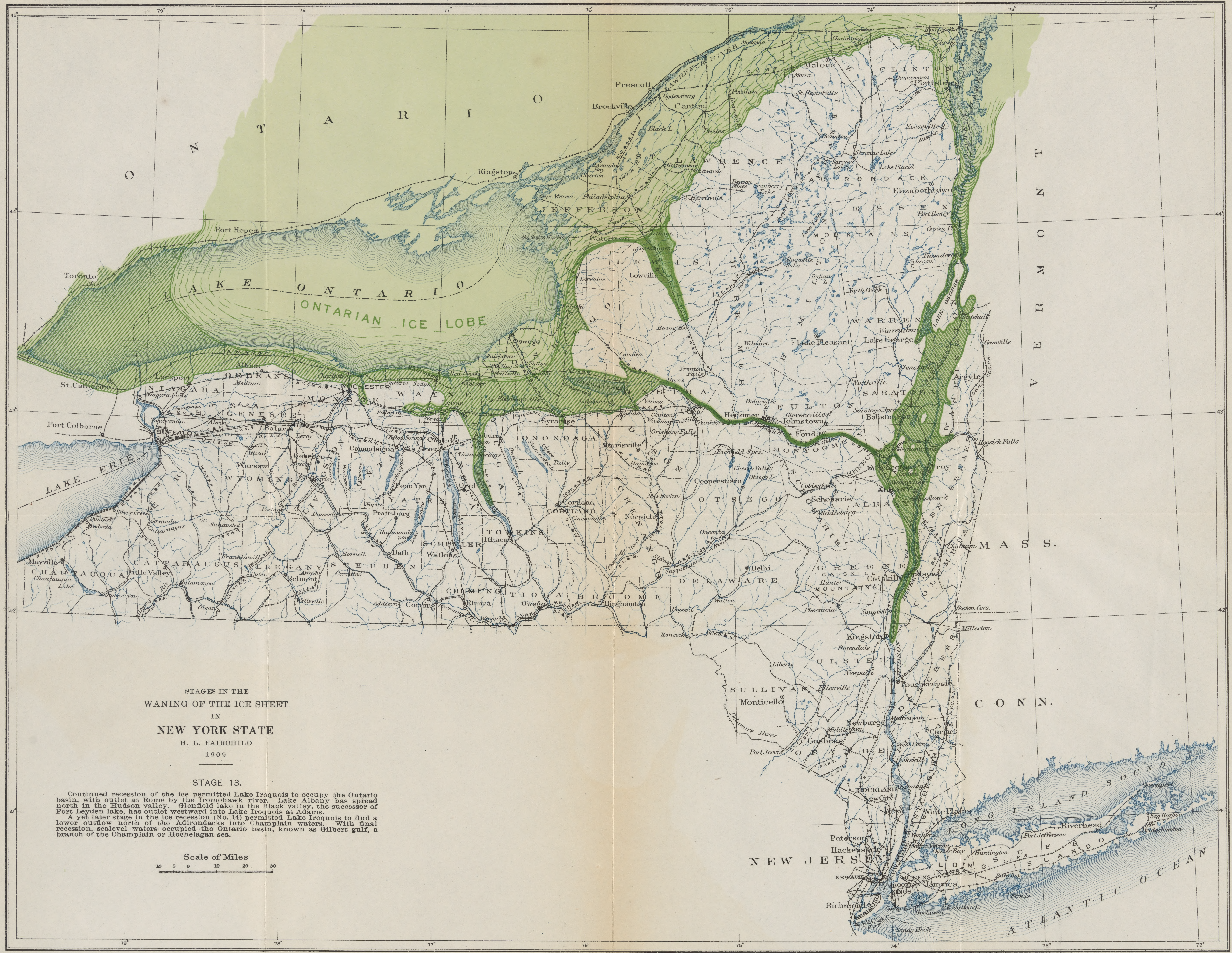
Scale of Miles

10 5 0 10 20 30

EDUCATION DEPARTMENT
JOHN M. CLARKE
STATE GEOLOGIST

UNIVERSITY OF THE STATE OF NEW YORK
STATE MUSEUM

BULLETIN 160 PLATE 17


O N T A R I O
LAKE ONTARIO
ONTARIAN ICE LOBE
LAKE ERIE
V E R M O N T
MASS.
CONN.
NEW JERSEY
ATLANTIC OCEAN
LONG ISLAND SOUND
ST. LAWRENCE RIVER
Toronto
Port Hope
Kingston
Brockville
Prescott
St. Catharines
Port Colborne
BUFFALO
ROCHESTER
Syracuse
Oswego
Watertown
Utica
Albany
Troy
Schenectady
Kingston
Poughkeepsie
Newburg
Ithaca
Elmira
Binghamton
Plattsburg
Malone
Ogdensburg
Massena
Lake George
Lake Placid
Saratoga Springs
Glens Falls
Whitehall
Ticonderoga
Catskill
Paterson
Hackensack
Newark
Jamaica
Riverhead
Sandy Hook
NIAGARA
ORLEANS
MONROE
WAYNE
GENESEE
WYOMING
LIVINGSTON
ONTARIO
YATES
SENECA
CAYUGA
ONONDAGA
OSWEGO
JEFFERSON
LEWIS
ST. LAWRENCE
FRANKLIN
CLINTON
ESSEX
HAMILTON
HERKIMER
ONEIDA
MADISON
CHENANGO
CORTLAND
TOMPKINS
SCHUYLER
STEUBEN
ALLEGANY
CATTARAUGUS
CHAUTAUQUA
CHEMUNG
TIOGA
BROOME
DELAWARE
OTSEGO
SCHOHARIE
MONTGOMERY
FULTON
SARATOGA
WARREN
WASHINGTON
RENSSELAER
ALBANY
GREENE
COLUMBIA
DUTCHESS
ULSTER
SULLIVAN
ORANGE
PUTNAM
WESTCHESTER
ROCKLAND
NASSAU
SUFFOLK
QUEENS
KINGS
RICHMOND
ADIRONDACK MOUNTAINS
CATSKILL MOUNTAINS
ERIE CANAL
79°
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43°
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41°

STAGES IN THE
WANING OF THE ICE SHEET
IN
NEW YORK STATE
H. L. FAIRCHILD
1909

STAGE 13.

Continued recession of the ice permitted Lake Iroquois to occupy the Ontario basin, with outlet at Rome by the Iromohawk river. Lake Albany has spread north in the Hudson valley. Glenfield lake in the Black valley, the successor of Port Leyden lake, has outlet westward into Lake Iroquois at Adams.

A yet later stage in the ice recession (No. 14) permitted Lake Iroquois to find a lower outflow north of the Adirondacks into Champlain waters. With final recession, sealevel waters occupied the Ontario basin, known as Gilbert gulf, a branch of the Champlain or Hochelagan sea.

Scale of Miles
10 5 0 10 20 30